

We claim:

1. An article comprising:

(A) a lean burn gasoline engine having an exhaust outlet;

(B) an upstream section having a close coupled catalyst

5 composite in communication with the exhaust outlet, the upstream close coupled catalyst composite comprising:

(i) a first support;

(ii) a first platinum group component; and

(iii) a SO<sub>x</sub> sorbent component selected from the group  
10 consisting of oxides and mixed oxides of barium, lanthanum, magnesium, manganese, neodymium, praseodymium, and strontium; and

(C) a downstream section comprising:

(i) a second support;

(ii) a second platinum group component; and

15 (iii) a NO<sub>x</sub> sorbent component;

wherein the upstream section has substantially no components adversely affecting three-way conversion under operating conditions.

2. The article according to claim 1, wherein the first and  
20 second supports are independently selected from the group consisting of alumina, titania, and zirconia compounds.

3. The article according to claim 2, wherein the first and second supports are independently selected from the group consisting of alumina, alumina-zirconia, and alumina-ceria.

25 4. The article according to claim 1, wherein the first platinum group metal component is selected from the group consisting of platinum, palladium, rhodium in combination with platinum or palladium, and mixtures thereof.

5. The article according to claim 1, wherein the upstream  
30 section further comprises a third platinum group metal component different from the first platinum group metal component.

6. The article according to claim 1, wherein the second platinum group metal component is selected from the group consisting of platinum, palladium, rhodium in combination with platinum or palladium, and mixtures thereof.
- 5 7. The article according to claim 1, wherein the downstream section further comprises a fourth platinum group metal component different from the second platinum group metal component.
8. The article according to claim 1, wherein the SO<sub>x</sub> sorbent component is selected from the group consisting of oxides and  
10 mixed oxides of barium, lanthanum, magnesium, neodymium, praseodymium, and strontium.
9. The article according to claim 8, wherein the SO<sub>x</sub> sorbent component is selected from the group consisting of oxides and mixed oxides of barium, lanthanum, and magnesium.
- 15 10. The article according to claim 8, wherein the SO<sub>x</sub> sorbent component is selected from the group consisting of oxides and mixed oxides of neodymium, praseodymium, and strontium.
11. The article according to claim 8, wherein the SO<sub>x</sub> sorbent component is La<sub>2</sub>O<sub>3</sub>.
- 20 12. The article according to claim 1, wherein the NO<sub>x</sub> sorbent component is selected from the group consisting of alkaline earth metal components, alkali metal components, and rare earth metal components.
- 25 13. The article according to claim 12, wherein the NO<sub>x</sub> sorbent component is selected from the group consisting of oxides of calcium, strontium, and barium, oxides of potassium, sodium, lithium, and cesium, and oxides of cerium, lanthanum, praseodymium, and neodymium.

14. The article according to claim 13, wherein the NO<sub>x</sub> sorbent component is selected from the group consisting of oxides of calcium, strontium, and barium.

15. The article according to claim 13, wherein the NO<sub>x</sub> sorbent component is selected from the group consisting of oxides of potassium, sodium, lithium, and cesium.

16. The article according to claim 12, wherein the NO<sub>x</sub> sorbent component is at least one alkaline earth metal component and at least one rare earth metal component selected from the group consisting of lanthanum and neodymium.

17. The article according to claim 1, wherein the upstream section or the downstream section, or both, further comprises a zirconium component.

18. The article according to claim 1, wherein the upstream substrate or the downstream substrate, or both, is supported on a metal or ceramic honeycomb carrier or is self-compressed.

19. A method for removing NO<sub>x</sub> and SO<sub>x</sub> contaminants from a gaseous stream comprising the steps of:

(A) operating a lean burn gasoline engine having an exhaust outlet;

(B) providing an upstream section comprising a close coupled catalyst composite in communication with the exhaust outlet and a downstream section:

(1) the upstream section having a close coupled catalyst composite comprising:

(i) a first support;  
(ii) a first platinum group component; and  
(iii) a SO<sub>x</sub> sorbent component selected from the group consisting of oxides and mixed oxides of barium, lanthanum, magnesium, manganese, neodymium, praseodymium, and strontium; and

(2) the downstream section comprising:

(i) a second support;  
(ii) a second platinum group component; and





32. The method according to claim 29, wherein the NO<sub>x</sub> sorbent component is selected from the group consisting of oxides of potassium, sodium, lithium, and cesium.

33. The method according to claim 19, wherein the NO<sub>x</sub> sorbent component is at least one alkaline earth metal component and at least one rare earth metal component selected from the group consisting of lanthanum and neodymium.

34. The method according to claim 19, wherein the upstream section or the downstream section, or both, further comprises a zirconium component.

35. The method according to claim 19, wherein the upstream substrate or the downstream substrate, or both, is supported on a metal or ceramic honeycomb carrier or is self-compressed.

36. The method according to claim 19, wherein the SO<sub>x</sub> desorbing temperature range in (D) is greater than about 550°C.

37. The method according to claim 19, wherein the SO<sub>x</sub> desorbing temperature range in (D) is greater than about 600°C.

38. The method according to claim 19, wherein the SO<sub>x</sub> desorbing temperature range in (D) is greater than about 650°C.

39. The method according to claim 19, wherein the SO<sub>x</sub> desorbing temperature range in (D) is greater than about 700°C.

40. A method of forming a catalyst composite having a close coupled upstream section and a downstream section which comprises the steps of:

- (A) forming a close coupled upstream section comprising:
- (i) a first support;
  - (ii) a first platinum group component; and
  - (iii) a SO<sub>x</sub> sorbent component selected from the group consisting of oxides and mixed oxides of barium, lanthanum, magnesium, manganese, neodymium, praseodymium, and strontium; and

(B) forming a downstream section comprising:

- (i) a second support;
- (ii) a second platinum group component; and
- (iii) a NO<sub>x</sub> sorbent component;

5 wherein the upstream section has substantially no components adversely affecting three-way conversion under operating conditions.

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